**ENDANGERED SPECIES ACTION - SECTION 7**

# Biological Opinion

## Asarco Smelter Site Shoreline Stabilization and Protection

**WSB-99-170**

Action Agency: U. S. Environmental Protection Agency

Consultation Conducted by: National Marine Fisheries Service, Northwest Region, Washington State Habitat Branch

Approved_____ Date Issued: June 15, 2000

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Regional Administrator

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## I. BACKGROUND AND DESCRIPTION OF THE PROPOSED ACTION

### A. Background/Consultation History

On May 6, 1999, the National Marine Fisheries Service (NMFS) received a draft Biological Assessment (BA) and draft Shoreline Stabilization and Protection, Intermediate Design Concept document for the Asarco Shoreline Armoring project, Commencement Bay, Washington from the U.S. Environmental Protection Agency, Region X (EPA). The NMFS was approached after the EPA had coordinated on the design of the shoreline stabilization project with regional resource management agencies such as the Washington State Department of Fish and Wildlife, Washington State Department of Ecology, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration (NOAA), Damage Assessment Coordinator, the NOAA Coastal Resources Coordinator (CRC), and the Puyallup and Muckleshoot tribes. According to the EPA, the design of the project had been modified significantly following coordination with the resource agencies and provided a good balance between the need for permanent stabilization of the slag breakwater and the need for continued habitat function. Following a period of comment and review, the EPA submitted the second version of the BA to the NMFS on February 23, 2000 for consultation. On April 21, 2000, NMFS replied with a request for additional information. Formal consultation was initiated on May 24, 2000.

The purpose of this Biological Opinion (BO) is to determine whether the proposed action is likely to jeopardize the continued existence of the Puget Sound chinook salmon (*Oncorhynchus tshawytscha*), or result in the destruction or adverse modification of critical habitat.

The NMFS reviewed the following information and engaged in the following steps to reach its determination and prepare this BO:

- the available BA's (Parametrix, 2000) and supplemental information provided by EPA described above;
- June 16, 1999 site tour of the Asarco site with EPA, resource management agencies, Asarco management and consultants to become familiar with the site and the proposed project;
- July 6, 1999 letter from the NMFS to EPA providing basic guidance on the development of consultations, and identifying specific topical needs;
- February 23, 2000 version of the BA, and updated draft of the Shoreline Stabilization and Protection, Intermediate Design Concept;
- April 13, 2000 meeting with EPA staff, the consultants from Asarco, NOAA CRC and U.S. Army Corps of Engineers staff to discuss comments and questions on the February 23, 2000 version of the BA;
- April 21, 2000 letter from the NMFS to EPA providing specific comments on the February 23, 2000 version of the BA;
- May 24, 2000 response from EPA to NMFS addressing comments from the NMFS April 21,

2000 letter.

In addition, other information was informally transferred between the NMFS and EPA during the preparation of this biological opinion.

**B. Description of the Proposed Action**

The proposed action, beginning on June 26, 2000 and running over a three year period, would include construction of shoreline protection measures in order to minimize the release by wind and wave erosion of arsenic and copper laden slag into Commencement Bay. Currently strong, storm-generated winds and high, steep waves raise the water level around an existing slag breakwater peninsula and contribute to long-term erosion of the slag and the transport of the slag material offshore. A detailed description of the proposed action is provided in the BA (Parametrix, 2000). This BO focuses specifically on the projected activities to occur between June 26, 2000 and February 15, 2001. Those areas include 2A, 2B, and the western portion of area 3 (depicted in the engineered drawings from section 50 + 36.6 to section 71 + 56.25). A summary of the entire proposed action is provided below.

The project site is located on the northwest shoreline of Commencement Bay, Puget Sound, in the town of Ruston and the City of Tacoma. Nearly 100 years ago, an industrial waste slag fill created a flat upland site extending from the original shoreline several hundred feet into Commencement Bay. The outer edges of the slag fill range from vertical to 3:1 slopes with the slag ranging from gravel particles to boulders. The fill and peninsula are comprised of either monolithic poured-in-place slag or granular to cobble-sized slag. Depths range from -2 feet mean lower low water (MLLW) to -20 feet MLLW along the slag fill and from 70 - >200 feet in depth in the vicinity of the breakwater peninsula.

The proposed action will modify virtually the entire shoreline of the site considered to be susceptible to active erosion. Granular slag beaches will be prepared for armoring by removal of debris, such as large concrete blocks, steel, rusted steel cables, and bricks and some slag material will be removed from below the extreme low tide level. The massive slag banks will be pulled back in most areas to allow for installation of armoring at the desired slopes. This will be conducted by ripping, or drilling and blasting, however, drilling and blasting will only be used as methods of last resort and will trigger consultation reintiation. Caves in the massive slag will be fully backfilled with controlled-density fill (CDF), a flowable concrete mixture of sand and cement, which will then be protected by a cover armor layer. The CDF will have initially set prior to tidal inundation. Following the shoreline preparation described above, fine grading followed by installation of geotextile fabric and armor stone and graded riprap rock will be placed as appropriate.

In addition to shoreline stabilization, habitat creation and enhancement will be conducted throughout the site. In particular, one area of the slag beach will be excavated to provide an intertidal habitat basin to offset water volume lost elsewhere along the shoreline. Excavation of the existing beach between 0 feet MLLW and 11 feet MLLW and shallowing of the slope will occur. The new habitat basin will be

covered with 18 inches of fine-grained substrate (silt/sand/gravel mix), riprap, and fish mix (*i.e.*, sediments in sizes and types designed for restoration of functional beach processes). Approximately 1.2 acres of intertidal beach will be created and 1.4 acres of beach will be enhanced. Conservatively, the action area includes the intertidal and subtidal shoreline of the site, extending approximately 200 feet offshore from the MLLW line, and approximately 1000 feet to the northeast and southeast along the shoreline.

Commencement Bay is an estuarine embayment adjacent to the deep, fjord system of south central Puget Sound. The waters are deep throughout the entire bay, ranging from 22.7 meters (m) at the head to 163.6m at the entrance (David Evans and Assoc., Inc., 1991 in COE *et al*, 1993). The waters shoal abruptly at the head of the bay to mudflats, which are exposed at low water. A significant input of freshwater and sediment load to the bay occurs from the Puyallup River, and to a much less extent from Hylebos and Wapato creeks. Between 37 and 76 hectares of intertidal mudflats exist scattered throughout the waterways and inner parts of the bay.

The southern shore of Commencement Bay along Ruston Way is comprised of a mix of land uses such as commercial, residential, industrial, and urban open spaces (USFWS and NOAA, 1996). This shoreline has been modified over the last 100 years through dredging and filling operations, and the creation of a peninsula derived from smelting slag. The project site is located about seven kilometers (km) from the mouth of the Puyallup River and associated mudflats.

## II. STATUS OF THE SPECIES AND CRITICAL HABITAT

Puget Sound chinook salmon and its critical habitat were proposed for listing as threatened on March 9, 1998 (50 CFR Parts 222, 226, and 227). A final rule to list the Puget Sound chinook salmon as threatened was published on March 24, 1999 (50 CFR 223 and 224). At the time of final rule, listing of Puget Sound chinook salmon critical habitat was not determinable for the evolutionarily significant unit (ESU). Additional time was required to complete the needed biological assessments and evaluate special management considerations affecting critical habitat. Therefore, NMFS extended the deadline for designation of critical habitat for one year until such assessments could be made and after appropriate consultations were completed. The final rule designating critical habitat was published on February 16, 2000 (65 Fed. Reg. 7764, February 16, 2000).

The species status review identified the high level of hatchery production which masks severe population depression in the ESU, as well as severe degradation of spawning and rearing habitats, and restriction or elimination of migratory access as causes for the range-wide decline in Puget Sound chinook salmon stocks (NMFS, 1998a, and 1998b). The understanding of the risk to naturally reproducing fish from a continuous infusion of artificially produced fish is unclear without extensive studies of the relative production and interactions between hatchery and natural fish. Without such information, the presence of hatchery fish in natural populations leads to substantial uncertainty in

evaluating the status of the natural population (NMFS 1998a).

Habitat alterations and subsequent availability, on the other hand, are clearly understood to impose an upper limit on the production of naturally spawning populations of salmon. The National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC, 1996). Some of the habitat impacts identified were the fragmentation and loss of available spawning and rearing habitat, migration delays, degradation of water quality, removal of riparian vegetation, decline of habitat complexity, alteration of streamflows and streambank and channel morphology, alteration of ambient stream water temperatures, sedimentation, and loss of spawning gravel, pool habitat and large woody debris (NMFS, 1998a, NRCC, 1996, Bishop and Morgan, 1996). Other factors such as urban growth, upland land use practices and polluted runoff, contaminants in coastal wetlands and estuaries, and dredge spoil disposal have also been identified as habitat problems contributing to the decline of chinook salmon (PFMC, 1995, WGSRO, 1999).

Puget Sound chinook salmon of this listed ESU that are likely to be adversely affected by the proposed action are present in Commencement Bay, hence within the action area (Water Resource Inventory Areas (WRIA) 10 & 12). Commencement Bay has been documented as a rearing and migration corridor, with natural spawning in the Puyallup River (SASSI, 1992). Beach seine and townet samples conducted along Ruston Way shoreline , in the vicinity of the action area, showed peak catches of juvenile chinook approximately 10-12 days later than the Commencement Bay waterway sites (Duker *et al*, 1989). This time lag produces juveniles that have grown in size and thus spend more time further offshore. This study showed high relative abundance of juvenile chinook along the Ruston Way shoreline early in the outmigration, prior to release of hatchery fish. The Puyallup Tribe conducted beach seine sampling between the years 1980-1995 and found juvenile chinook along the Ruston shoreline from the middle of March to the middle of September when sampling ceased (PIE, 1999). The occurrence of juvenile chinook corresponded with the latest date of sampling. Hence, one could presume that juvenile chinook reside in Commencement Bay throughout the entire winter. The issue of estuarine residency is uncertain.

The proposed action would occur within designated critical habitat for Puget Sound chinook salmon. In the case of the Puget Sound evolutionarily significant unit (ESU), due to the unique combination of geographic features, proximity to a large number of rivers and stream supporting chinook salmon, and wide range of human activities occurring within Puget Sound's, the NMFS believes that it is necessary to designate critical habitat of this estuarine area (63 Fed. Reg. 11510, March 9, 1998). The NMFS has identified the current freshwater, estuarine, and marine range of Puget Sound designated critical habitat to encompass all essential habitat features adequate to ensure the species' conservation (65 Fed. Reg. 7764, February 16, 2000). The NMFS recognizes that estuarine habitats are important for rearing and migrating chinook salmon, and has included them in the designation for critical habitat (63 Fed. Reg. 11510, March 9, 1998).

The NMFS believes that adopting a more inclusive, watershed-based description of critical habitat is appropriate because it (1) recognizes the species' use of diverse habitats and underscores the need to account for all of the habitat types supporting the species' freshwater and estuarine life stages, from small headwater streams to migration corridors and estuarine rearing areas; (2) takes into account the natural variability in habitat use (e.g., some streams may have fish present only in years with plentiful rainfall) that makes precise mapping difficult; and (3) reinforces the important linkage between aquatic areas and adjacent riparian/upslope areas (63 Fed. Reg. 11511, March 9, 1998).

Essential features of chinook salmon critical habitat include adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space and safe passage conditions (Simenstad *et al*, 1982, NRCC, 1996, Palmisano *et al*, 1993, Gregory and Bisson, 1997, Spence *et al*, 1996). The NMFS has identified a limited number of specific activities that may require special management considerations for freshwater, estuarine, and marine life stages of chinook salmon habitat, including land management and dredge and fill activities (65 Fed Reg. 7764, February 16, 2000).

Losses of wetlands, tidal sloughs, and estuaries in heavily urbanized or industrialized river basins have been extensive; in some areas of Puget Sound, >95 percent of estuaries and coastal wetland habitats have been eliminated since the 19$^{th}$ century (Sherwood *et al*, 1990, Simenstad *et al*, 1992). At the head of Commencement Bay, the vast expanse of saltmarsh, mudflats, and tidal channels, that is evident from historical maps and aerial photographs, has been almost totally eliminated by dredging and filling over the last 100 years (COE *et al*, 1993). Along the southern shoreline, a variety of industrial, commercial and recreational activities occur. A number of man-made features, such as roads supported by riprap bulkheads, a marina basin, and the 2000 ft long slag breakwater peninsula stem from those activities (Parametrix, 2000).

## III. EVALUATING THE PROPOSED ACTION

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). The NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of (1) defining the biological requirements and current status of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of injury or mortality attributable to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific

to the listed salmon's life stages that occur beyond the action area. If NMFS finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives for the action.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' designated critical habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. The NMFS identifies those effects of the action that impair the function of any essential element of critical habitat. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify critical habitat it must identify any reasonable and prudent measures available.

Guidance for making determinations on the issue of jeopardy and adverse modification of habitat are contained in *The Habitat Approach, Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids*, August 1999. (Appendix I)

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NMFS' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for rearing, migration and spawning of the Puget Sound chinook salmon under the existing environmental baseline.

**A. Environmental Baseline**

The environmental baseline represents the current basal set of conditions to which the effects of the proposed action are then added. The term "environmental baseline" means "the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process." 50 C.F.R. § 402.02. The term "action area" means "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action". The action area includes the intertidal and subtidal shoreline of the site, extending approximately 200 feet offshore from the MLLW line, and approximately 1000 feet to the northeast and southeast along the shoreline.

The NMFS is familiar with numerous activities that influence the current environmental baseline conditions in Commencement Bay including expanding urban development, railroads, shipping, logging, agriculture and other industries. Land uses such as dredging and relocation of the Puyallup River, construction of waterways for the purposes of navigation and commerce, steepening and hardening formerly sloping and/or soft shorelines with a variety of material, and the continued development of the Port of Tacoma and other upland developments has resulted in habitat loss. Marsh areas have been filled for residences, barns and roads. Other habitat losses are the result of contaminated water and

sediment from industrial and domestic discharges. Dredging and diking, and channeling the Puyallup River altered the suitability of habitat to wetland and aquatic plants, benthic invertebrates and to listed salmonids (USFWS and NOAA, 1996). In addition, the current distribution of salmonids in the Puyallup basin is affected by dams, weirs, culverts, screens, falls, and other artificial or natural features which may hinder or obstruct their passage, as well as by changes to the hydraulic regime and other habitat modifications.

Artificial propagation programs provide the dominant salmonid population in the Puyallup River. The White River spring chinook population, which is listed as critical by state and tribal fisheries managers, now depends largely on some degree of artificial production, such as the Muckleshoot White River Hatchery (SASSI, 1992).

**B. Status of the Species within the Action Area**

The paucity of data makes it difficult to determine the status of Puget Sound chinook within the action area. Overall abundance of chinook salmon in this ESU has declined substantially from historical levels, and many populations are small enough that genetic and demographic risks are likely to be relatively high (63 Fed. Reg. 11494; March 9 1998). Escapement of Puyallup River/White River chinook are moderate in comparison to escapement data from other runs within the Puget Sound ESU. Recent 5-year geometric mean spawning escapement for the Puyallup River/White River average around 1000-10,000 fish. Both long- and short-term trends in abundance are predominantly downward, and several populations within this ESU are exhibiting severe short-term declines (63 Fed. Reg. 11494; March 9 1998). Trends in estimated abundance of the Puyallup River/White River chinook appear to be increasing from 1-5%. However, according to Nehlsen and workers (1991, in Myers et al, 1998) these stocks pose special concern and moderate extinction risk, respectively.

Three runs of chinook salmon inhabit the Puyallup River basin including a spring run in the White River, a summer/fall run in the White River, and a fall run in the Puyallup River (SASSI, 1992). Puyallup River fall run chinook salmon were listed by state and tribal fisheries managers as a stock of special concern and spring chinook are considered to be nearing extinction (Salo and Jagielo, 1983, *in* Parametrix, 2000). The Washington Department of Fish and Wildlife recently listed the status of the White River summer/fall run chinook salmon as unknown due to inconsistent spawner survey data (SASSI, 1992). Chinook salmon of the Puyallup River basin exhibit primarily ocean-type life history strategies, with smolts migrating to the ocean during their first year, mature at ages 3 and 4, and have coastal-oriented ocean migration patterns (Myers *et al.*, 1998).

The summer/fall run of chinook salmon in the White River is distinct from the spring run based upon run timing, and distinct from the fall run based on geographic distribution of spawners. Spawning occurs from late-September through October, peaking in late August and early-September (Salo and Jagielo, 1983 *in* Parametrix, 2000). Spawning occurs from late-September through October in the lower White River, lower Clearwater River, and lower Greenwater River (SASSI, 1992). The summer/fall

chinook stock is considered wild and the stock status is unknown due to inconsistent spawner counts (SASSI, 1992).

Puyallup River fall chinook salmon are distinct from other chinook runs based on their run timing and spawning distribution, which occurs in the Puyallup River upstream of Sumner, and in tributaries including the Carbon River, South Prairie Creek, Wilkeson Creek, Voight Creek, and Clarks Creek (SASSI, 1992). Fall chinook primarily spawn from September through October, with most natural production occurring in South Prairie Creek. Non-native hatchery chinook releases into the Puyallup River have been made since the 1960s primarily with Green River stock. Status of the fall run chinook in the Puyallup River is known due to inconsistent spawner survey data (SASSI, 1992).

**C. Factors Affecting the Species Environment within the Action Area**

The biological requirements of the listed species currently are not being met under the environmental baseline over the ESU. Declines in relative abundance for Puget Sound chinook may be attributable to extensive agricultural, port (including industrial and commercial), residential development, as well as flood control over the past 150 years. To improve the status of the chinook, significant improvements in the environmental conditions of the critical habitat are needed.

To evaluate the factors affecting the species covered in this biological opinion, the NMFS uses the Matrix of Pathways and Indicators (MPI) approach. The MPI for marine environments was developed for this assessment from the MPI originally developed for similar assessments in the forested environment. The MPI describes pathways which are major environmental factors affecting salmon in the natural environment. Pathways in the original MPI include water quality, physical habitat, and habitat access. The MPI also describes "indicators" which are elements of pathways. For example, indicators for water quality include temperature, sediment, and chemical contamination. The pathways that are implicated for analysis under the proposed action include water quality, physical, and biological habitat. These pathways are suggested for analysis because of the potential that the activities underlying this proposed action are likely to affect them. The MPI approach provides the assessment tool to evaluate the current environmental baseline condition.

In the action area, specific factors that may affect the quantity and quality of habitat for chinook include: shoreline substrate composition and slope, and water quality

Substrate composition along the shoreline in the vicinity of the project site varies from massive slag with vertical faces, cobbles and boulders, to areas of granular slag with sand and gravel-sized particles). Those areas with granular slag are subject to erosion by wave action, hence no aquatic vegetation or aquatic fauna are able to become established. Existing shoreline areas with massive slag and vertical or near vertical faces are subject to undercutting and sloughing of the steep faces by wave action, similarly limiting the establishment of aquatic flora or fauna. As the slag erodes, the particles which contain high concentrations of metals are distributed at the face of the breakwater, as well as throughout the bay.

The shoreline at the project site ranges from vertical faces to slopes of 2:1. Substrate at the base of the steep shoreline is generally fine sediment which extends out into deep water. This composition and slope differs from that in the action area. Shorelines adjacent to the project site are mostly 2:1 riprap at the mid to upper intertidal elevations, with moderate slopes (<5:1) at the lower intertidal elevations. A short section of shoreline immediately south of the project site has moderate to gentle slopes throughout the intertidal elevations. There is currently no riparian vegetation within the action area.

The shoreline substrate in the action area is comprised of a mix of materials. The substrate of native material can be described as shallow gradient beaches with sand substrate and eelgrass at low-tide elevation and typically larger-sized material (*i.e*., rock rip-rap) at high tide levels (Duker *et al*, 1989). The bottom sediments in the vicinity of Point Defiance park, the most southerly location, is comprised of small gravel and sand. Moving towards the head of the bay, in the vicinity of sewer outfalls, the sediments are comprised on sand with wood chips and other organic matter. Sediments at the mouth of Thea Foss waterway are comprised of sand to mud with some stone, wood chips and shell fragments. Bottom profiles of the shoreline between City Waterway and Point Defiance indicate a 3 to 9% slope (Simenstad *et al*, 1993).

Concentrations of metals in the water column along the shoreline at times exceed the Washington State ambient water quality criteria. These concentrations appear to be due to both ground water passing through contaminated upland soils on the project site, as well as surface water loads originating from the site, as well as along the Ruston Way shoreline. Outer Commencement Bay, in the vicinity of the action area, currently has the water quality classification of Class A. The bay has been listed on the 303(d) list of impaired waterbodies for not meeting its applicable water quality standards. The Department of Ecology (1995, in USFWS and NOAA, 1996) summarized high priority issues of concern in the Puyallup River/White River basin, including arsenic, lead, mercury and zinc in outer Commencement Bay.

A visual survey of the habitat characteristics of the project site yielded little visible flora or fauna. Thirteen species of algae were identified and ranged from common to scattered patches. Where non-slag rocks were present on the project site, no differences between the macro invertebrates and algae were discerned. While the survey targeted macrofauna, meiofauna were assumed to exist in the sandy substrate (Parametrix, 2000).

## IV. EFFECTS OF THE PROPOSED ACTION

NMFS' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or critical habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline." "Indirect effects" are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 C.F.R. § 402.02).

Multiple stress factors will have incremental effects on the species, adding to the overall stress encountered throughout their life stages. The effects of any one factor for decline can be complicated by the influence of others. The recent development history of a population can influence its response to any one factor for decline. For example, if a population was exposed to a prolonged series of high temperatures, lowered dissolved oxygen (DO), and/or water borne contaminants, it may be more readily infected with disease organisms that further weakens its resistance to new temperature, DO, and/or contaminant exposures, or other physical or biological factors. This initial exposure can leave the population weakened from energy depletion through inadequate food intake, high metabolic costs, and negative growth. The probability of increased mortality from predation, disease and competition in these cases is greater than when a population is confronted with only one factor for decline. The overlay of numerous factors for decline was considered for this project.

To evaluate direct and indirect effects associated with the proposed project, it is critical to address elements of the life history of Puget Sound chinook. The use of Commencement Bay as a rearing and migration corridor, and natural spawning has been documented in the Puyallup River (SASSI, 1992; Simonstad *et al*, 1982; Simonstad, 1999). The limited shallow water habitat in the vicinity of the project site raises questions about the use of the area for rearing. However, shallow beaches to the east and west of the project site appear to be suitable rearing habitat. And the project site does offer scattered sand-gravel to small cobble beaches with moderate intertidal slopes (Parametrix, 2000).

The proposed shoreline stabilization, protection, and enhancement is likely to adversely affect Puget Sound chinook. The NMFS considers the shoreline stabilization, protection and enhancement project to produce short-term effects such as loss of productivity of epibenthic invertebrates, short-term water quality exceedances through turbidity and potentially through exceedances of water column metals concentrations. In addition, the project will produce a long-term effect of steepening the slope at the western edge of the breakwater peninsula. The proposed project will also provide a beneficial effect by minimizing inputs of metals contamination into the water column through prevention of future erosion of the arsenic slag, and creating additional intertidal habitat for rearing and migration.

**A. Direct Effects**

Direct effects are the immediate effects of the project on the species or its habitats. Direct effects result from the agency action and may include the effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated.

The timing of construction (June 26 - February 15) may overlap with the juvenile chinook outmigration. The direct effects of the project are related to the extent and duration of the construction activities in the water and whether the fish are migrating and rearing at that time. In the proposed project, short-term negative effects may occur during construction of the intertidal habitat basin, pulling back and armoring the massive slag along a portion of the breakwater tip, and filling of the caves with controlled density fill.

The first two activities will likely increase turbidity in the water column, and have the attendant effect of decreasing the water quality as a result of leaching of metals from the fresh face of the slag (Crecelius, 1986). High concentrations of suspended sediments may cause avoidance in juvenile salmonids in freshwater (Bisson and Bilby, 1982). Moderate turbidity levels (11-49 NTUs) may cause juvenile steelhead and coho to leave rearing areas (Sigler *et al*, 1984).

Water quality limitations have been identified as examples of potential causes of injury to listed fish in both final and draft regulations developed to implement the ESA (NMFS, 1998b; NMFS, 1998c) The definition of "Harm" includes discharging pollutants, such as oil, toxic chemicals, radioactivity, carcinogens, mutagens, teratorgens, or organic nutrient-laden water including sewage water into a listed species' habitat as possibly causing take. Water quality and quantity limitations are associated with triggering the onset of sublethal effects such as disease in previously infected salmonid populations. The onset of disease is thought to be exacerbated by the added stress of poor water quality and quantity conditions (NMFS, 1998c). In addition, factors associated with urbanization have been implicated in 58% of the declines and 9% of the extinctions among 417 surveyed stocks (NMFS, 1998d). Such factors include discharging of pollutants.

The shoreline stabilization, protection and enhancement activities will cause the temporal loss of prey items for rearing juvenile salmonids. The diet of outmigrating ocean-type chinook salmon appears to be generalist and opportunistic (Healey, 1991b). Benthic invertebrates including amphipods (*Eogammarus* and *Corophium* spp.), harpacticoid copepods, mysids, and cumaceans, are important components of the diet, particularly for smaller fish (Kjelson et al, 1982; Healey, 1991b). While the continued production of food sources within the action area will provide food for outmigrating juveniles, the three year duration of the project will likely diminish food production on the site. However, over time, the proposed project should offer greater prey resources resulting from the minimization of erosion and through the development of the intertidal habitat basin.

It is unclear how fish rearing may be influenced in the proposed intertidal habitat basin on the site. Shallow-water, nearshore habitat is important for the migration of juvenile ocean-type salmon because of the abundance of appropriate prey resources and refuge from predators (Simenstad *et al*, 2000). Properly functioning refuges act as detritus traps which are highly productive with the kinds of organisms on which young salmon feed (Healey, 1982). Juvenile salmon travel throughout intertidal habitat areas during rearing and migration. They have been found to migrate to the fullest extent of the upper intertidal area during a flood tide, and then retreat to subtidal channels upon tidal recession (Healey, 1991a). One may expect to observe increased fish densities in the proposed intertidal habitat basin during flood tides, and no fish in the area during ebb tides.

**B. Indirect Effects**

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur (50 C.F.R. § 402.02). Indirect effects may occur outside of the area directly affected

by the action. Indirect effects may include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. These actions must be reasonably certain to occur, or they are a logical extension of the proposed action.

Availability of rearing habitat is very ecologically important for outmigrating smolts. During their residence in the estuary, juvenile salmonids require refugia for resting, smoltification, and predator avoidance. Predation occurs throughout the life cycle of salmonids and is an important mortality agent. Many inter-dependent factors affect the magnitude of predation mortality, including the characteristics of prey, characteristics of predators, and characteristics of the environment and critical habitat (e.g. habitat, and environmental stresses such as contaminant stress). Mortality during early marine life is often quite high with mortality rates up to 77% occurring during the first several days of life in saltwater (Salo *et al*, 1980).

Indirect effects related to this project are those that may affect the newly created or enhanced rearing habitat of the project site. Failure of the intertidal habitat basin to achieve proper function may occur if establishment of riparian trees and shrubs is precluded, *e.g.*, by trampling or lack of post-planting maintenance. Also, temperature effects from the lack of riparian vegetation, runoff from the use of pesticide, or impacts from public use of the newly created park may directly affect the ability of outmigrants to rear and find refuge onsite.

### C. Effects on Critical Habitat

The proposed actions will affect essential features of the designated critical habitat for Puget Sound chinook. The NMFS designates critical habitat for listed species based on physical and biological features that are essential to each species. Essential features of critical habitat for chinook salmon include: adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions. Of these essential features, the NMFS determined that the construction activities associated with the bank stabilization, protection and enhancement project may influence water quality in the form of turbidity and metals concentration, food, space and riparian vegetation.

## V. CUMULATIVE EFFECTS

Cumulative effects are defined as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR § 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Significant improvements in the Puget Sound chinook rearing and migration in Commencement Bay are

unlikely without changes in land and water-use practices, particularly stormwater management, source control and contaminated sediments cleanup, spill prevention and containment, port management practices, and shoreline development. Gradual improvements in habitat conditions for salmonids are expected in Commencement Bay as a result of a number of forthcoming activities. In the very near future, the EPA will oversee the cleanup of contaminated bottom sediments in the vicinity of the project site, as well as in many of the waterways at the head of the bay. While the Asarco sediment cleanup project is not being considered in this BO, it will have the beneficial effect on critical habitat by removing, through dredging or capping, a portion of the sediments contaminated with arsenic and copper. In addition, NMFS is aware that efforts, over the last seven years, have lead to the development of a Master Development Plan, which describes the framework for redevelopment at the project site. The framework includes elements for commercial and/or light industrial development, park and pedestrian access development, boat ramp renovation, as well as revegetation of steep slopes to the appearance of the forested hillsides similar to those to the north and south of the site.

One source of potential cumulative effects is from the use of pesticides used by the Metropolitan Park District of Tacoma on the park vegetation. Standard pesticide registration focuses on concentrations that are lethal for fish when determining application rates. The NMFS is concerned about sublethal effects such as neurological behavior effects stemming from standard rates of application of pesticides (Solomon and Giddings, 2000), however, very little is known at this time.

Until improvements in non-Federal actions occur, NMFS assumes that future private and State actions will continue at similar intensities as in recent years. However, now that the Puget Sound chinook ESUs are listed under the ESA, NMFS assumes that private and State project proponents in will take steps to curtail or avoid actions that would result in the take of chinook. Future Federal actions, including future cleanup actions and in-water and shoreline construction, will be reviewed through separate section 7 processes.

## VI. CONSERVATION MEASURES PROPOSED BY THE ACTION AGENCY

The proposed action is being conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. The design is impacted by all of the attendant CERCLA requirements such as performance standards and criteria as defined in a consent decree (U.S.A v. Asarco, Inc. 1997). Design objectives which supplement the performance standards are the following:

- Excavation of the flatter "beaches" will be intentionally avoided or minimized in order to reduce the short term impacts to the shoreline from sediment and exposure of new slag faces (areas 2A and 3).

- Shoreline protection will cover exposed granular slag with riprap or habitat basin ballast. Fish

mix, a mixture of sand, gravel, and cobbles will be used to cover the riprap in most areas and provide better habitat for young salmon and other fish (areas 2A, 2B and 3).

- The flatter slopes of the intertidal beaches will be lightly armored (areas 2A, 2B and 3).

- In order to keep seaward incursion to a minimum, fill needed for armoring will be balanced with seaward excavation from the habitat basin in area 2B (areas 2A and 3).

- All areas of the shoreline will be provided with "soft", natural rock armoring that contours itself to shoreline undulations, rather than rigid protection structures of concrete or steel (areas 2A, 2B and 3).

- Fish mix will be incorporated into the intermediate design in areas with slopes gentle enough to sustain it. A total of 4.2 acres of intertidal beach will be provided in this manner (areas 2A, 2B and 3).

- Dirt shall be kept out of intertidal areas (areas 2A, 2B and 3).

- Contractor shall use best management practices for excavation in or near the tidal zone (areas 2A, 2B and 3).

- The excavated material will be free draining and shall be allowed to drain prior to transport or disposal to prevent free water from eroding excavated soils (areas 2A, 2B and 3).

- Where the armor ties into intertidal beaches, the beach habitat shall be preserved by taking special care to preserve existing armor units and replace them in the same position while still ensuring that the new armoring is thoroughly anchored in place (areas 2A, 2B and 3).

- Visual surveys for fish between June 26 - 30, 2000.

## VI. CONCLUSION/OPINION

The NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Puget Sound chinook or result in the destruction or adverse modification of designated critical habitat. The determination of no jeopardy was based on the current status of the Puget Sound chinook salmon, the environmental baseline for the proposed action area, and the effects of the proposed action.

The timing and location of the proposed bank stabilization, protection and enhancement may affect rearing and cause increased predation. Specifically, the proposed measures of employing a silt curtain to minimize turbidity, may act to trap migrating juveniles. Additionally, creation of the intertidal habitat

basin without appropriate riparian vegetation may provide less than properly functioning rearing habitat. Cumulative effects such as the use of pesticides for park maintenance, and disturbance of rearing juveniles as a result of public access, may also pose an increase risk to future migrating individuals.

The NMFS expects that, overall, the project will assure progress towards attaining properly functioning conditions within the action area. Any negative effects associated with the construction activities may be minimized or eliminated through the adherence to the project design objectives, and adherence to the recommended timing of construction. The proposed activities are not likely to appreciably reduce the likelihood of survival and recovery of Puget Sound chinook based on the area that will be affected, and the future beneficial effects of the project. In other words, at the spatial scale of the ESU, the action area represents a relatively low percentage of designated critical habitat for chinook.

## VIII. REINITIATION OF CONSULTATION

Consultation must be reinitiated if: the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action that may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or, a new species is listed or critical habitat is designated that may be affected by the action (50 CFR § 402.16).

In addition, specific to the proposed project, reinitiation is required for the remaining two project years. The current BA only provides project design details and an effects analysis for the current year's construction actions, hence this consultation only addresses the same. As the design details are established for the remaining segments of the project, including plans and specifications for the stormwater outfall, reinitiation is required. At the time of reinitiation, a revised effects analysis may be required.

## IX. INCIDENTAL TAKE STATEMENT

Sections 4 (d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering (50 C.F.R. 222. 102). Harass is defined as actions that create the likelihood of injuring listed species to such an extent as significantly alter normal behavior patterns that include, but are not limited to, breeding, feeding and sheltering. Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not

considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary; in order for the exemption in section 7(o)(2) to apply, they must be implemented by the action agency so that they become binding conditions of any grant or permit issued to the applicant as appropriate. The EPA has a continuing duty to regulate the activity covered in this incidental take statement. If the EPA fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. The take statement also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

**A. Amount or Extent of Take**

The NMFS anticipates that an undetermined number of Puget Sound chinook salmon may be taken as a results of full implementation of the proposed action. The actual number of individual fish taken as a result of the underlying project is impossible to determine. While direct injury or death may unintentionally result during construction activities, harm is more likely to accrue by exposure of fish to temporarily degraded environmental conditions during rearing and migration portions of their life histories. The timing, duration, and extent of such exposure will vary during the course of the project activities, with varying results, described above, all of which fall under the definition of harm. The qualitative results of such effects can be described in this opinion, but no techniques presently exist to correlate those effects with the potential numerical extent of take. Therefore, for the purposes of this opinion, the extent of take is correlated to the extent of habitat affected. Accordingly, the reasonable and prudent measures were developed to address the extent of habitat effects, as described below.

The incidental take of this species is expected to be in the form of harm, harassment, kill and injury, resulting from activities covered under this biological opinion. Incidental take may occur through short-term exposure of juvenile Puget Sound chinook to multiple stresses from elevated turbidity, contaminants released in the water column, increased predation caused by installation of the silt curtain, and temporary loss of the prey base. These multiple stressors may pose long-term population impacts such as the increase in mortality from predation and/or disease, multiple generational impacts, reduction in vigor, and long-term fecundity. In the accompanying biological opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat, and are not expected to be measurable in the long term. Reasonable and prudent measures have been developed to address and minimize the extent of affected habitat.

**B. Reasonable and Prudent Measures**

The NMFS finds that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Puget Sound chinook.

1. The EPA shall provide native riparian vegetation around the intertidal habitat basin to provide shade, and debris to support rearing.

2. The EPA shall conduct fish surveys (identify migration and rearing) to apply to subsequent years construction timing window.

3. The EPA shall use restorative soils, *e.g.*, fish mix, approved by Washington State Department of Fish and Wildlife biologists.

4. The EPA shall monitor the project following construction according to a long-term monitoring plan. A copy of the monitoring reports shall be provided to Robert Clark, Habitat Conservation Branch, Seattle, Washington.

5. The EPA shall restrict public access to the intertidal habitat basin.

**C. Terms and Conditions**

To be exempt from the prohibitions of section 9 of the ESA, the parties must comply with the following terms and condition, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. Native riparian vegetation (woody and non-woody) shall be planted on the upland bank of the intertidal habitat basin. This vegetation should be installed within the first year following completion of construction of the intertidal habitat basin. The EPA shall provide photo documentation of the plantings of the intertidal habitat basin soon after completion of planting. The intertidal habitat basin riparian vegetation should be monitored throughout the life of site monitoring and should be maintained (without the use of pesticides) or replaced as necessary.

2. Fish surveys (e.g., beach seines) for Puget Sound chinook shall be conducted throughout the life of the project to provide information on fish utilization at the site. The design of the fish surveys should be reviewed and approved by the NMFS. All data should be provided to Robert Clark, of the Habitat Conservation Branch, Seattle, Washington by April 15, 2001.

3. Fish mix should be designed to achieve the desired objective for the site. If the fish mix washes away over time, the EPA shall employ either of the following options:

a. re-nourish with a different type of fish mix;

b. apply a soft armoring approach to soften the slope to forestall erosion of the fish mix.

The specifics for this contingency should be built into the Operations and Maintenance Plan

which should be reviewed and approved by the NMFS.

4. In order to achieve the desired objective and to assure achievement of properly functioning condition for area 2B, public access should be restricted around the intertidal habitat basin. Plans for the restriction should be reviewed and approved by the NMFS, and should be maintained in perpetuity.

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## Appendix I: The Habitat Approach